CLAIMS

1. A method of improving a start up operation of a direct drive CCFL circuit, the method comprising:

driving a CCFL of the direct drive CCFL circuit at a switching frequency substantially different than a resonant frequency; and

allowing the switching frequency to approach resonant frequency in a controlled manner.

2. The method of Claim 1, wherein allowing the switching frequency to approach resonant frequency in a controlled manner includes:

monitoring an input voltage and a current through of the CCFL to determine whether the switching frequency is incrementally changed to approach resonant frequency.

3. The method of Claim 2, wherein monitoring includes:

determining whether the input voltage is equal to or less than a predetermined intermediate voltage and an output voltage of the CCFL, which is proportional to the current of the CCFL, is less than a predetermined low voltage; and

if so, then incrementally changing the switching frequency to approach resonant frequency.

4. The method of Claim 3, wherein monitoring includes:

determining whether the input voltage is greater than the predetermined intermediate voltage but less than a predetermined high voltage; and

if so, then holding the switching frequency at its current value.

5. The method of Claim 4, wherein monitoring further includes:

determining whether the input voltage is above the predetermined high voltage; and

if so, then resetting the switching frequency to the frequency substantially different than a resonant frequency and restarting a duty cycle of a switching waveform from 0% and the allowing the duty cycle to increase .

6. The method of Claim 5, wherein monitoring further includes:

determining whether the input voltage is equal to or less than the predetermined intermediate voltage and the output voltage is equal to or greater than the predetermined low voltage; and

if so, then entering steady state operation.

7. The method of Claim 6, wherein monitoring further includes:

setting a timer when start up begins;

determining whether the timer has expired when one of the input voltage is greater than the predetermined intermediate voltage and the output voltage is less than the predetermined low voltage; and

if so, then shutting down the direct drive CCFL circuit.

8. A method of monitoring for fault conditions in a direct drive CCFL circuit during steady state operation, the method comprising:

monitoring an input voltage of and a current through the CCFL, wherein if one of the input voltage is greater than a predetermined intermediate voltage and an output voltage of the

CCFL, which is proportional to the current through the CCFL, is less than a predetermined low voltage for a predetermined number of clock cycles, then shutting down the direct drive CCFL circuit.

9. The method of Claim 8, wherein if the input voltage is equal to or less than the predetermined intermediate voltage and the output voltage is equal to or greater than the predetermined low voltage, then

determining whether a current frequency of the CCFL is greater than a resonant frequency,

wherein if so, then incrementally changing the current frequency to approach resonant frequency, and

wherein if not, then holding the current frequency.

10. A method of transitioning from a start up to a steady state of a direct drive CCFL circuit, the method comprising:

after a CCFL in the direct drive CCFL circuit strikes, forcing the CCFL to be at maximum brightness for a predetermined number of dimming cycles; and

after the predetermined number of dimming cycles, then enabling fault monitoring.

11. A circuit for determining current through multiple tubes in a direct drive CCFL system, the circuit comprising:

means for determining a first output voltage from a first tube, the first output voltage being proportional to a current through the first tube;

means for determining a second output voltage from a second tube, the second output voltage being proportional to a current through the second tube;

means for combining the first and second output voltages; and

means for comparing the combined voltage to a predetermined voltage, the predetermined voltage being proportional to a current that indicates that all of the multiple tubes have struck or that one of the multiple tubes is unable to pass current.

12. The circuit of Claim 11, wherein the predetermined voltage is 1.25 V.

13. The circuit of Claim 11, wherein the means for determining the first output voltage includes:

a first resistor coupled between a low voltage source and an output terminal of the first tube; and

a first diode having a cathode connected to the first resistor and an anode connected to the means for combining.

14. The circuit of Claim 13, wherein the means for determining the second output voltage includes:

a second resistor coupled between the low voltage source and an output terminal of the second tube; and

a second diode having a cathode connected to the second resistor and an anode connected to the means for combining.

15. The circuit of Claim 14, wherein the means for combining includes:

a third resistor coupled between a high voltage source and an anode of the first diode;

a fourth resistor coupled between the high voltage source and an anode of the second diode;

a third diode having an anode connected to the anode of the first diode and a cathode connected to the means for comparing; and

a fourth diode having an anode connected to the anode of the second diode and a cathode connected to the means for comparing.

16. The circuit of Claim 15, wherein for each pair of tubes added to the circuit, additional resistor/diode pairs are provided to determine output voltages of the tubes.

17. The circuit of Claim 16, wherein for each pair of tubes added to the circuit, the additional resistor/diode pairs are connected to the means for combining.